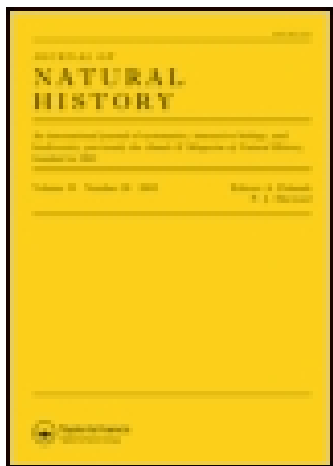


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Annals and Magazine of Natural History: Series 5

Publication details, including instructions for authors and subscription information:
<http://www.tandfonline.com/loi/tnah11>

XX.—Diagnoses of new species of Cephalopoda collected during the Cruise of H.M.S. 'Challenger.'—Part II. The Decapoda

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Published online: 09 Oct 2009.

To cite this article: William E. Hoyle M.A. M.R.C.S. F.R.S.E. (1885)
XX.—Diagnoses of new species of Cephalopoda collected during the Cruise of H.M.S. 'Challenger.'—Part II. The Decapoda , Annals and Magazine of Natural History: Series 5, 16:93, 181-203, DOI: [10.1080/00222938509459868](https://doi.org/10.1080/00222938509459868)

To link to this article: <http://dx.doi.org/10.1080/00222938509459868>

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on the chitinous coat and the surface of the other free at the circumference; cemented together and held in position by the microcell-structure or "float," which, projecting above the level of the outer heads of the birotules, gives rise to the roughened state of the surface of the statoblast. Chitinous coat and germinal contents the same as in the *Spongillæ* generally. Size of specimen sent to me about $\frac{1}{4} \times \frac{1}{4}$ inch horizontally.

Hab. Fresh water.

Loc. "Ice-Factory Lakes, De Land, Florida, near the St. John's River."

Obs. The extremely delicate character of the spiculation generally, the microspined skeletal spicules, the great length of the birotules, and the radiating portions of the head being horizontal and *not* recurved at their extremities, allies this species more to *Meyenia fluviatilis* than to the *Heteromeyenix* (e. gr., *Spongilla Baileyi*, Bk., Proc. Zool. Soc. 1863, pl. xxxviii. fig. 6) of Mr. Potts. Hence the name.

XX.—*Diagnoses of new Species of Cephalopoda collected during the Cruise of H.M.S. 'Challenger.'*—Part II. *The Decapoda.*

By WILLIAM E. HOYLE, M.A. (Oxon), M.R.C.S., F.R.S.E., Naturalist to the 'Challenger' Commission.

[Published by permission of the Lords Commissioners of H.M. Treasury, and extracted from a paper read before the Royal Society of Edinburgh, July 6, 1885.]

Myopsidæ.

PROMACHOTEUTHIS, Hoyle.

Promachoteuthis, Hoyle, 1885, Narr. Chall. Exp. vol. i. p. 273, fig. 109.

The *Body* is short, rounded, with large broad *fins*, situated posteriorly. The *mantle* is free behind, as in *Rossia*. The *siphon* is short and slender and with everted margin; valve?

The *Head* is small and narrow; *eyes* not prominent.

The *Arms* are long and conical, with two series of pedunculate spherical *suckers*. The *tentacles* exactly resemble the arms at their origin; the club is absent.

The *Gladius* has not been removed from the single example.

Promachoteuthis megaptera, Hoyle (*loc. cit.*).

The *Body* is short, barrel-shaped, rounded behind; the *fin* is large, transversely elliptical, and extending beyond the end of the body posteriorly; each half is wider than long. The *mantle-margin* is transversely truncated. The *mantle-connective* consists of a linear ridge on either side, fitting into an almond-shaped depression at either side of the base of the *siphon*, which is short, slender, and has the distal margin everted, like the neck of a flask; the specimen was so small and indifferently preserved that it was not opened to ascertain whether a valve was present.

The *Head* is very small and narrow, almost the whole of its sides being occupied by the *eyes*, which are not prominent, but covered with a transparent membrane, and with a distinct pore in front of and below each.

The *Arms* are unequal, the fourth being the shortest (considerably so on the right side); the first, second, and third are subequal; they are on an average about the same length as the body, smoothly conical, and tapering evenly to fine points. The *suckers* are in two series throughout, pedunculate, spherical, with a lateral aperture directed inwards; the *horny ring* is smooth and surrounded by a few large papillæ. The *hectocotylus* is not developed. There is no trace of an *umbrella*. The *buccal membrane* is well developed and has the usual seven points, but they are not very well marked or provided with suckers; the membrane is not connected with the arms by ligaments. There seems to be only one *lip*, which is thick and papillate.

The *Tentacles* arise directly between the third and fourth arms, exactly resembling them at their origin, and obviously being part of one series with them; the *stem* is swollen at first and somewhat more than one third up the arms narrows rather suddenly to about half its previous diameter. The *club* is wanting.

The *Surface* is smooth.

The *Colour* is a dull purplish madder, paler on the fins (especially their under surface) and on the arms and tentacles.

The *Gladius* has not been extracted.

Hab. North Pacific, east of Japan (Station 237), 1875 fathoms. One specimen, sex?

LOLIGO, Lamarck.

Loligo ellipsura, n. sp.

The *Body* is elongated, widest anteriorly, and tapering

gradually to an acute point behind. The *fin* is comparatively short, only one third the length of the body, elliptical, slightly broader than long. The *mantle-margin* passes almost straight across the back, except where a long narrow median process juts out over the head; it is slightly sinuate ventrally. The *siphon* is short and blunt.

The *Head* is short and very nearly as broad as the body; it has the usual auricular crest and pre-ocular pore.

The *Arms* are unequal, the order of length being 3, 4, 2, 1, and about one third the length of the body; the first has a distinct web on its dorso-median angle, and the third a still broader web on its outer aspect, passing back nearly as far as the eye, where it becomes connected with another passing up the dorso-lateral aspect of the fourth. The *suckers* are in two series, pedunculate, oblique, notched distally, and somewhat larger on the lateral than on the other arms. The *horny rings* bear from five to seven large pointed teeth in their distal portion, but are smooth proximally. The *hectocotylus* is not present. The *buccal membrane* has the usual seven points, each of which carries two or three small suckers. The *outer lip* is thick and marked with radial grooves; the *inner lip* was not seen.

The *Tentacle* is slender, approximately cylindrical, and about two thirds the length of the body; its terminal fourth is occupied by the *club*, which is but little expanded, and has a delicate protective membrane along either side of the inner surface and a well-marked web externally. The large median *suckers* are about ten in number, and about twice as large as the alternating lateral; the proximal are about twenty, and gradually increasing; the distal occupy nearly one half the club, and are in four series diminishing. The *horny rings* of the largest suckers have about twenty-four distant square pointed teeth, much longer on the distal margin; the lateral ones have about half as many similar teeth on the outer margin, and the terminal suckers are armed in the same way.

The *Surface* has been almost entirely denuded of skin.

The *Colour* appears to have been pale buff with purple chromatophores.

The *Gladius* has not been extracted.

Hab. Off Sandy Point, South America (Station 313), 55 fathoms. One specimen, apparently ♀.

Loligo galatheæ, Steenstrup, MS.

The *Body* is about three times as long as broad, cylindrical anteriorly, and pointed behind. The *fin* is rather less than

half the length of the body *, about as long as broad, and with rounded lateral angles. The *mantle-margin* curves out rapidly to a triangular process in the dorsal median line, for the rest is almost transverse, except where it forms two obtuse-angled processes, one at either side of the ventral margination.

The *Head* is comparatively broad and with prominent rounded *eyes*. The *siphon* is moderately large and of the usual form.

The *Arms* are unequal, the order of length being 3, 4, 2, 1, and not quite one third as long as the body. The dorsal have a distinct keel on the upper margin, the second are keeled on the ventro-lateral aspect, the third are stout and flattened and have a broad web on the outer aspect, which unites with the web running up the dorso-lateral aspect of the ventral arms. The *suckers* are in two series throughout, with short peduncles, and not very oblique; their horny rings bear nearly twenty distant blunt teeth. The *hectocotylus* is not developed. The *umbrella* is absent. The *buccal membrane* has the usual seven points, each of which bears a few suckers. The *outer lip* is thin, the *inner* thin and papillate.

The *Tentacles* are comparatively short, being not quite so long as the body; the *stems* are subtriangular. The *club* occupies more than one third of the length, and has a protective membrane at either side of the suckers and a distinct web on the outer aspect. The large central *suckers* are from eight to ten in number, and nearly twice the diameter of the lateral ones; the proximal group consists of about ten, while the distal portion bears four series of diminishing suckers. The *horny ring* bears long, distant, bluntly pointed teeth, about twenty-four in the largest suckers, proportionally fewer in the smaller, which are much larger in the distal and external portions of the ring respectively.

The *Surface* is smooth.

The *Colour* is pale yellowish, spotted with brownish-purple and red chromatophores.

The *Gladius* has not been removed.

Hab. Philippine Islands (Station 203), 20 fathoms. Two specimens, juv.

Loligo kobiensis, n. sp.

The *Body* is elongated, cylindrical in the anterior moiety,

* With respect to this and one or two other points in the description it must be remembered that the specimens are immature.

then tapering posteriorly, and terminating in a blunt point. The *fin* is more than half the length of the body, trapezoidal, with rounded lateral angles; the extreme breadth is less than the length and is situated anteriorly to the middle of the fin. The *mantle-margin* presents a triangular process in the mid-dorsal line and is deeply sinuate ventrally. The *siphon* is short and bluntly conical.

The *Head* is short and not so broad as the body; the *eyes* are comparatively small and have a bracket-shaped auricular crest behind and a minute pore in front of them.

The *Arms* are unequal, the order of length being 3, 4, 2, 1, and, on the average, rather more than one third the length of the body; the first are the most slender, and have the dorso-medial angle raised into a prominent keel; the second have only a faintly-marked angle ventro-laterally; the third have a broad web externally, passing over at the base into one which extends up the dorsal aspect of the lateral arms. The *suckers* are arranged in two series, pedunculate, very oblique, and rather larger on the lateral than on the other arms; the *horny ring* has about nine short, close-set, square-cut teeth on its distal side, and is smooth on the proximal. The *hectocotylus* was not observed. The *buccal membrane* has five points, each of which bears two or three small suckers; the two ventral points are rounded off; just within the ventral margin is a small papilla surrounded by two elevated rings, probably for the reception of spermatophores. Both the *outer* and *inner lips* are folded.

The *Tentacle* is faintly three-sided and shorter than the body, one third of its length being taken up by the *club*, which is expanded and triangular in section; there is a protective membrane on either side and a web externally; in the centre are eight large *suckers*, three times the diameter of the lateral ones; at the proximal end are about nine suckers, gradually increasing in size, and at the distal end more than twenty rows arranged in four series, gradually diminishing. The largest suckers are scarcely at all oblique, and have the margin cut up by radial grooves into a number of small papillæ, an arrangement also found on the outer margin of the lateral suckers, but not in the terminal ones. The *horny rings* of the largest suckers are smooth; those of the lateral bear about twelve long distant teeth on their outer margin; those of the terminal suckers are similarly armed.

The *Surface* is smooth.

The *Colour* is pinkish yellow, with purplish chromatophores.

The *Gladius* has not been extracted.

Hab. Off Kobi, Japan, 8 fathoms; one specimen, ♀. South of Japan (Station 233 c), 11 fathoms; two specimens, juv. Also (?) Inland Sea, Japan; two specimens, juv.

Loligo edulis, n. sp.

The *Body* is moderately stout, being about three times as long as broad, cylindrical in its anterior third, and tapering gradually to a bluntish point. The *fin* occupies a little more than half the length of the body, rhomboidal, not quite so broad as long, and broadest anteriorly to the middle; the lateral angles are rounded. The *mantle-margin* has a slight projection in the median dorsal line and a broad shallow sinuate excavation ventrally. The *siphon* is of moderate length and bluntly pointed.

The *Head* is small, with prominent rounded *eyes*, and bears the usual auricular crest and preocular pore.

The *Arms* are unequal, the order of length being 3, 4, 2, 1, and about half as long as the body. The first are very slender and bear a distinct keel on the dorsal aspect; the second are thicker and triangular, and have a broad keel almost expanding into a web on the lateral aspect; the third are the stoutest, flattened from above downwards, and distinctly keeled externally; the fourth are intermediate between the third and second, triangular, and with a broadish web extending the whole way up the dorso-lateral aspect. They all have a web up each side of the inner face. The *suckers* are in two series, very oblique, and with slender conical peduncles, their size varying with that of the arms on which they are situated; the *horny ring* bears eight long square-cut teeth on its distal margin. The *hectocotylus* is developed as usual on the left ventral arm, which bears proximally ten rows of suckers, then a minute sucker with an exaggerated peduncle, and beyond this two series of long conical papillæ. The *buccal membrane* has the usual seven angles produced into long lappets, each of which bears about eight suckers in two rows; the *outer lip* is moderately thick; the *inner lip* much thicker and marked with deep radial grooves.

The *Tentacles* are about as long as the body, with flattened *stems*; about one third their length is occupied by the *club*, which is only slightly expanded, and has a protective membrane on either side, but a dorsal web is present only at the extremity. The central *suckers* are about sixteen in number and about one third larger than the laterals; the proximal are about ten; the distal are closely packed in four series. The *horny rings* of the largest are provided with about twenty

larger teeth, with which smaller ones alternate somewhat regularly; the lateral bear about ten distant acute teeth on the outer margin, while the proximal and distal groups are similarly armed on the distal margin.

The *Surface* is smooth.

The *Colour* is a dull yellow with purplish chromatophores.

The *Gladius* is of the usual form, the narrow anterior portion being less than one fourth of the total length.

Hab. Japan; purchased in the market, Yokohama. One specimen, ♂.

Loligo japonica, Steenstrup, MS.

The *Body* is only moderately elongated, being about three times as long as broad, and bluntly pointed behind. The *fin* is a little more than half the length of the body, about as long as broad, rhomboidal, rounded laterally, and very slightly notched at the anterior angles. The *mantle-margin* curves gradually forward to a projecting point in the dorsal median line, and is deeply emarginate ventrally. The *siphon* is short and of the usual form.

The *Head* is comparatively large and rounded; the *eyes* are swollen and prominent.

The *Arms* are unequal, the order of length being 3, 4, 2, 1, and on an average about half as long as the body; the first are very small, slender, and rounded; the second have a prominent ventro-lateral angle, not amounting to a keel; the third have a distinct web on the outer aspect of the distal portion, which is continued backwards as a faint ridge which joins the web lying along the dorsal lateral edge of the fourth. The *suckers* are in two series, and vary in size in accordance with the arms on which they are situated; they are subglobular and oblique. The *horny ring* bears about ten broad, close-set, square-cut teeth. The *hectocotylus* is present on the left ventral arm; the distal suckers of the ventral series only are modified into conical papillæ, some of which bear a minute sucker at their tips. The *umbrella* is absent; the *buccal membrane* is well developed, has the usual seven points, each of which bears a few small suckers (occasionally only one). The *outer lip* is thick, thicker than the *inner*; both are cut up into papillæ along the edge.

The *Tentacles* are as long as the head and body together, and have very slender, almost cylindrical *stems*; the *club* occupies about one fourth of the whole length, and is but slightly expanded. The large central *suckers* are about eight in number and fully twice the diameter of the lateral ones;

proximally to them are about half a dozen suckers of different sizes, and beyond them a large number of diminishing ones arranged in four series and occupying nearly half the length of the club. The *horny ring* in the largest suckers bears about twenty-five square teeth; in the lateral suckers it bears more than twenty close-set bluntly pointed teeth, and in the distal ones about the same number of similar character.

The *Surface* is smooth.

The *Colour* is pale, with purplish chromatophores.

The *Gladius* is of quite typical form, expanded behind, and about six times as long as broad; the narrow anterior extremity occupies less than one third of the total length.

Hab. Japan; purchased in the market at Yokohama. One specimen, ♀.

SEPIA, Linné.

Sepia esculenta, n. sp.

The *Body* is broad, stout, and semielliptical posteriorly. The *fins* are about one fourth of the body in breadth and commence within 6 millim. of the anterior margin, and end within 5 millim. of each other; the *mantle-margin* is produced far over the head dorsally, and evenly truncated below. The *siphon* just reaches the gap between the ventral arms.

The *Head* is broad and the *eyes* laterally prominent.

The *Arms* are subequal, the order of length being 4, 1, 2, 3, and nearly half as long as the body; they are all more or less compressed, especially the ventral ones; they have a distinct web along the outer margin, and a rather broad membrane runs up either side of the sucker-bearing face. The *suckers* are in four series throughout, not very obliquely set; they are large and spheroidal, and have meridional markings on the outer surface; the *horny ring* is smooth and surrounded by a narrow papillate area. In the *hectocotylized* arm of the male the first four rows of suckers are normal, then come two rows of gradually diminishing suckers, succeeded by four rows of minute ones, after which they regain their normal dimensions. The *umbrella* is narrow, widest between the second and third arms, where it reaches up to the fifth row of suckers. The *buccal membrane* has the usual seven points in the male; in the female the two ventral ones are rounded off; the *spermatic cushion* is exceedingly well developed, and has four deep transverse grooves. The *outer lip* is thin and longitudinally corrugated; the *inner lip* is thick and bears numerous very long papillæ.

The *Tentacles* are absent.

The *Surface* is smooth throughout.

The *Colour* is dull grey, mottled with black above, yellowish below.

The *Shell* is elliptical in *outline*, somewhat broader behind (especially in the female); the *chitinous margin* is narrow and does not form a complete ridge across the shell below the spine; it forms two slightly expanded wings behind, and extends but a little distance over the *dorsal surface*, which is marked with coarse rugosities disposed in curved lines parallel to the anterior margin; a distinct but low rib runs down the centre. The *ventral surface* is elevated on either side of a deep median groove; the *last locus* covers about one fifth of the surface, and is bounded posteriorly by two slightly wavy lines, meeting at an acute angle; the *striated area* is long, and the angle between the striæ widens posteriorly. The *inner cone* is very well developed; the *limbs* arise one fifth of the length of the shell forward, and gradually become more elevated until they enclose a deep conical cavity. The *spine* is strong, pointed, and somewhat curved laterally in the female example.

Hab. Japan; purchased in the market at Yokohama. Two specimens, 1 ♂, 1 ♀.

Sepia elliptica, n. sp.

The *Body* is ovoid, broadest one third from the anterior margin, pointed behind. The *fins* are one third the width of the body, broadest in the middle, extending the whole length of the body, and approaching within 2 millim. of each other posteriorly. The *mantle-margin* not very prominent over the head dorsally. The *mantle-connective* is rather short and deep, but otherwise normal. The *siphon* is conical, reaching within 1 millim. of, or quite up to, the space between the ventral arms.

The *Head* is very short and broad, the *eyes* prominent.

The *Arms* are subequal, the order of length being 4, 3, 2, 1; they are nearly half the length of the body, and taper evenly to fine points; there is a distinct but narrow ridge along the fourth and a delicate web along each side of the oral aspect of the arms. The *suckers* are in four series throughout, and of moderate size, marked with inconstant meridional grooves, and there is a large notch proximally and distally in the rim. The *horny ring* has for the most part no distinct teeth, but is marked in the distal half with shallow irregular notches, which are occasionally more regular. A papillary

area surrounds the horny ring. The *hectocotylus* is developed in about the middle third of the left ventral arm; beyond the eighth row of suckers the two ventral series are continued of the normal size, but the two dorsal are each represented by five minute suckers, gradually diminishing to the middle one and then increasing again; beyond this the arm exhibits no peculiarities. The *umbrella* is widest between the two lateral arms, where it extends as far as the sixth row of suckers. The *buccal membrane* bears the usual seven distinct points in the male, whilst in the female the ventral pair are lost in the thick swollen *spermatic cushion*; this is subdivided by four or five deep grooves into as many transverse ridges. The *outer lip* is thin; the *inner* bears about half a dozen rows of distinct hemispheroidal papillæ.

The *Tentacles* are about as long as the mantle; the *stem* is indistinctly three-sided; the *club* is long and wide, and bears eight series of minute equal suckers; there is a *protective membrane* on either side and a broad *fin* on the dorso-internal aspect. The *horny ring* is small and has a smooth margin.

The *Surface* is smooth.

The *Colour* is a dull grey dorsally, pale yellowish below.

The *Shell* is broad, subelliptical in *outline*, the anterior extremity bounded by two straight lines, which form obtuse rounded-off angles with each other and the sides of the shell; the posterior is rounded gradually off. The *dorsal surface* has a faint ridge passing to each of the three angles just mentioned, and is covered with curved rows of tubercles parallel to the anterior margin. The *ventral surface* is but little elevated; the *last locus* occupies one third of it, and is bounded behind by a broadly open curve with three or four irregular sinuations in it. The *striated area* is hollowed posteriorly and is marked by grooves corresponding to the sinuations just mentioned. The *inner cone* arises about half-way along the striated area, curves evenly outwards, and then rises into a distinct ridge, forming a wall separate from the margin of the shell; its ventral surface is marked by a number of striae pointing in the direction of the *spine*, which is of medium length and strength, and curved gently upwards.

Hab. South of Papua (Station 188), 28 fathoms; four specimens, 1 ♂, 3 ♀. Also Station 190, 49 fathoms; four specimens, 1 ♂, 3 ♀.

*Sepia Smithi**, n. sp.

The *Body* is of medium breadth, widest one third back,

* Named after Mr. Edgar A. Smith, F.Z.S., of the British Museum.

curving evenly to a pointed posterior extremity. The *fin* is nearly one third the breadth of the body, extending from the anterior margin of the mantle to within 4 millim. of its fellow at the posterior extremity. The *mantle-margin* projects to a considerable extent over the head dorsally, and is slightly emarginate ventrally. The *siphon* is long, reaching up to the interspace between the ventral arms.

The *Head* is of medium breadth and the *eyes* prominent.

The *Arms* are subequal, their order of length being 4, 3, 2, 1; they are a little more than half as long as the body; the dorsal are the smallest and subconical, the ventral wide and with a narrow web on the outer aspect; they all taper gradually to fine points. The *suckers* are in four series throughout, pedunculate, oblique, and notched proximally and distally, and with meridional grooves on the margin; the *horny ring* has about twenty blunt triangular teeth on the distal semicircumference, and is surrounded by a broad papillate area. The *hectocotylus* is not present. The *umbrella* is but slightly developed, reaching in its greatest extent (between the third and fourth arms) only to the fourth row of suckers. The *buccal membrane* has the usual seven points, but there is no *spermatic cushion*. The *outer lip* is moderately thick and longitudinally ribbed; the *inner* is provided with many rows of elevated rounded papillæ.

The *Tentacles* are about as long as the mantle, and have stout three-sided *stems*; the *club* occupies about one fourth of the whole length, and extends fully half round the stem; a protective membrane is found at either side of them and a web along the dorso-median aspect of the club. The *suckers* are very numerous, minute and closely packed; the *horny ring* has about eight or ten stout distant teeth on the distal margin.

The *Surface* is for the most part smooth, but there are about five elongated elevations down each side of the body near the origin of the fin, and a few minute papillæ on the dorsal surface.

The *Colour* is a dull purplish grey above, pale ochre below.

The *Shell* is roughly elliptical in *outline*; the anterior extremity is bounded by two straight lines forming a blunt rounded angle; the sides curve evenly outwards (the greatest breadth being a little anterior to the middle) and form a bluntish point behind. The *chitinous margin* is narrow and vanishes in the median ventral line behind. The *dorsal surface* is rough, with granules arranged in rows parallel to the anterior margin; three slightly elevated tracts diverge from the spine to the three anterior angles. The *ventral surface*

is little elevated; the *last locus* occupies one fourth of the length, and is emarginate, being bounded behind by a more or less evenly curved line; the *striated area* is excavated, so that the whole shell is thin; the *inner cone* is well developed, with a thickened rounded margin, and encloses a deep pit; the limbs extend halfway along the striated area. The *spine* is long, tapering, and curves gently upwards.

Hab. South of Papua (Station 188), 28 fathoms. Four specimens, ♀.

Sepia sulcata, n. sp.

The *Body* is cylindrical in its anterior fourth, then tapering gradually backwards, and pointed behind. The *fins* are one fifth the breadth of the body, commence 2 millim. from the anterior margin of the mantle, and approach within 5 millim. of each other posteriorly; the *mantle-margin* reaches far over the head dorsally, and is evenly truncated below. The *siphon* does not extend up to the interbrachial space.

The *Head* is broad and the *eyes* very prominent; in the only specimen it is much retracted into the mantle.

The *Arms* are subequal, the order of length being 4, 3, 2, 1; they are one third the length of the mantle, and taper gradually to slender points; the first are thin and rounded, the fourth flattened; each has a distinct ridge on the outer side, which in the fourth expands into a broad membrane. The *suckers* are in two series in the first and second arms, but with a tendency to form four series in the others, more especially in the distal portions; they are pedunculate and very oblique, and the margin is marked with meridional grooves and has a deep distal notch; the *horny ring* is small, smooth, and surrounded by a papillate area. The *hectocotylus* is present along three fourths of the left ventral arm in the form of a groove with convex bottom, bounded on either side by a narrow fillet; on either margin of the groove is a row of minute suckers, which are larger and more distinct, and even form two series on the ventral aspect; the tip of the arm bears two series of small suckers. The *umbrella* is better developed than usual, its greatest extent (between the lateral arms) being up to the eighth row of suckers. The *buccal membrane* has the usual seven points, but not very strongly marked; the *outer lip* is smooth and thin, the *inner* papillate.

The *Tentacle* is as long as the head and body together, with a slender and somewhat flattened stem; the *club* is short and rather broad, and has a protective membrane on either side of the suckers, and a broad web on the dorsal aspect, extending

for a distance equal to half its length down the stem : there are from six to eight rows of very minute *suckers*, subequal, and with smooth *horny rings*.

The *Surface* is smooth, except that on one side of the ventral surface are three slightly raised linear ridges, apparently due to contraction, and a few minute papillæ on the dorsal surface posteriorly.

The *Colour* is on the whole pale, yellowish below, purplish above.

The *Shell* is hemielliptical in *outline* anteriorly, tapering to a point behind. The *chitinous margin* is rather broad, widest about two thirds back ; it covers all except the median third of the *dorsal surface*, which is finely rugose where free, and has a slightly elevated median portion and a faint linear ridge in the middle line posteriorly, about 3 millim. long, and terminating 2 millim. from the base of the spine. The *ventral surface* is but little elevated ; the *last locus* occupies more than one third of it, and its posterior boundary is almost semicircular, inflected in the centre. The *inner cone* is evanescent ; its limbs are chitinous and form a ventral margin to the terminal cone. A *spine* is present, but, as it had been broken off, its length and form cannot be determined.

Hab. Off the Ki Islands (Station 192), 140 fathoms. One specimen, ♂.

Sepia andreanoides, n. sp.

The *Body* is very long, broadest one third of the way back, pointed and acuminate behind. The fins are narrow, commence 3 millim. behind the anterior margin, and terminate 5 millim. from the posterior end of the body, and passing on to the dorsal aspect of the body, each approaches within 3 millim. of its fellow. The *mantle-margin* extends well over the head dorsally, and is very slightly emarginate ventrally. The *siphon* extends rather further forward than the middle of the eyes, but not up to the space between the ventral arms.

The *Head* is decidedly narrower than the body and somewhat elongated ; the *eyes* being distended and laterally prominent.

The *Arms* are subequal, the order of length being 1, 2, 3, 4, or 1, 4, 3, 2 ; they are two fifths the length of the body, elongated, conical (except the fourth pair, which are flattened), and taper to very slender tips. The *suckers* seem to be normally in four series, but in some cases the arms are so compressed that they seem to be in only two, especially at the proximal extremities of the first and second arms ; they are

globular, slightly oblique, with a small aperture and smooth *horny ring*. The *hectocotylus* occupies the distal half of the left ventral arm; the suckers are normal up to the twelfth row, after which the arm widens and has a median groove from which about twelve shallow grooves pass outwards on either side, separating raised portions, each of which bears a minute sucker on the dorsal side of the groove. The *umbrella* is present only between the second and third and third and fourth arms up to the fourth row of suckers. The *buccal membrane* is well developed and has the usual seven points; in the female there is a thick deeply grooved *spermatic cushion*. The *outer lip* is thin and smooth, the *inner* thick and papillate.

The *Tentacles* are somewhat longer than the head and body, very slender and somewhat flattened. The *club* is flattened and expanded; along its outer margin is a very narrow membrane, and along the median edge, at some distance from the cupules, is a broad web, marked on the dorsal aspect with fine parallel shallow oblique grooves; along one margin it bears three or four series of small pedunculated *suckers*, whose *horny rings* bear very numerous and acute teeth.

The *Surface* is smooth.

The *Colour* is a dull purplish grey above, ochre with purple chromatophores below.

The *Shell* has a narrow elongated oval *outline*, somewhat pointed in front and tapering gradually backwards; the *chitinous margin* extends about one third across the *dorsal surface*, which shows the boundary lines of the loculi clearly as brown striæ, and is very minutely roughened: the *ventral surface* is elevated, so that the shell is thick in proportion to its breadth, a narrow groove runs down the centre: the *last locus* occupies one fourth of the surface and is bounded posteriorly by a shallow open curve. The *posterior extremity* is a very flattened irregular cone, to the apex of which the spine is attached; the *inner cone* is very shallow and its opening is some 4 millim. from the margin of the outer cone. The *spine* is long, straight, and points directly backward.

Hab. Japan; purchased in the market at Yokohama. Three specimens, 1 ♂, 2 ♀.

Sepia kiensis, n. sp.

The *Body* is narrow, widest anteriorly, and tapering gradually backwards: the *fin* is narrow, less than one quarter the breadth of the body, widening a little behind; it commences

1 millim. from the anterior margin and extends to within 2 millim. of its fellow behind. The *mantle-margin* is prominent dorsally and slightly emarginate ventrally. The *siphon* does not quite extend to the bases of the arms.

The *Head* is broad, and the *eyes* rounded and prominent.

The *Arms* are subequal, the order of length being 4, 3, 2, 1; they are very short, about one third the length of the body; the first and second are conical, the third flatter, with a slight ridge externally, and the fourth broad and flat with a distinct crest. The *suckers* are in four series throughout, small, spheroidal, and not very oblique; the *horny ring* is smooth. The *hectocotylus* is not developed. The *umbrella* is evanescent, extending at most only up to the second row of suckers: the *buccal membrane* has five points and is rounded dorsally; the *spermatic cushion* is but slightly developed. The *outer lip* is thin and grooved longitudinally, the *inner* thicker and papillate.

The *Tentacle* is as long as the head and body; the *stem* being slender and indistinctly three-sided. The *club* is very slightly expanded; a protective membrane, grooved obliquely on the dorsal aspect, is situated on the outer margin, and there is a web on the internal side. The *suckers* are in four or five series, which are slightly larger towards the inner margin; the *horny ring* presents a few acute teeth.

The *Surface* is smooth throughout.

The *Colour* is a dull reddish grey above, yellowish below.

The *Shell* is a very elongate oval in *outline*; the *chitinous margin* is very narrow and extends only slightly over the *dorsal surface*, which is finely granular and marked by the divisions between the *loculi*: the *ventral surface* is somewhat elevated and marked by a distinct but not very deep median groove; the *last loculus* extends over more than one third of the shell and is bounded posteriorly by an almost semicircular line; the *striae* are very close; the limbs of the *inner cone* arise about midway along the shell, pass backwards as low, narrow, smooth filets, and unite behind without forming any deep cavity; the *posterior extremity* is curved towards the ventral aspect and ends in a narrow blunt cone, to the apex of which is attached the straight dorsally directed spine.

Hab. Off the Ki Islands, south of New Guinea (Station 192), 140 fathoms. One specimen, ♀.

Sepia kobiensis, n. sp.

The *Body* is long and narrow, widest near the anterior margin, and tapers gradually backwards. The *fin* is very narrow, only one eighth of the body; it commences 3 millim.

from the margin of the body and posteriorly passes on to the ventral surface and terminates 2 millim. from its fellow and 4 millim. from the extremity of the body. The *mantle-margin* has a narrow projection over the head, and is evenly truncated ventrally. The *siphon* is short, not reaching halfway to the space between the ventral arms.

The *Head* is of medium breadth, and the *eyes* prominent laterally.

The *Arms* are subequal, the order of length being 2, 4, 3, 1, and less than one third of the length of the body; the first two pairs are subconical and slender, the third broader and with a web running up the ventral aspect, the fourth wider and with a distinct ridge along the outer edge; they all taper to very fine points. Many of the *suckers* are deficient, but they seem to have stood in four series throughout; they are spheroidal and very oblique; the distal margin of many has a deep notch: the *horny ring* is smooth in most cases, but occasionally possesses a few angular teeth. The *hectocotylus* is not developed. The *umbrella* is but little developed, its greatest extent being on the ventro-lateral aspect, where it reaches the fourth row of suckers. The *buccal membrane* has the usual seven points, the two ventral being the least distinct (as usual in female specimens); the *spermatic cushion* is small. The *outer lip* is narrow, the *inner* wide and papillate.

The *Tentacle* is shorter than the body and slender; the *stem* has three sides, the inner being slightly hollow, with a slender fillet along the middle. The *club* is slightly expanded with a distinct protective membrane; the inner side of the club is deeply grooved, and internally to the groove is a rather broad fin. The *suckers* are in about five series; near the inner margin are three rather larger than the rest, which gradually diminish towards the outer margin. The *horny rings* of the larger suckers have about twenty fine teeth on the distal semicircumference, the smaller have fewer in proportion.

The *Surface* is smooth all over.

The *Colour* is a dark purplish grey above, paler below.

The *Shell* is a very elongated oval in outline; the *chitinous margin* is very narrow and extends one third over the *dorsal surface*, which is smooth and evenly convex, with the exception of a slight ridge along the middle line: the *ventral surface* is elevated, so that the shell is thick, with a shallow median groove becoming evanescent posteriorly; the *last loculus* occupies one third of the surface and is bounded by a slightly curved line with a cusp where the median groove meets it: the *inner cone* is formed by two limbs, which arise halfway along the shell and form rounded fillets slightly

more elevated posteriorly, where they bound a shallow depression : outside them the margin of the shell expands into a sub-circular plate, from the centre of which the *spine* projects backwards ; no information can be given as to its form or length, as it has been broken off close to the base.

Hab. Kobi, Japan, 8 fathoms. One specimen, ♀.

Sepia papuensis, n. sp.

The *Body* is elongated, broadest about one third back, pointed behind : the *fins* extend the whole length of the body and are one third of its breadth, a little wider behind ; they extend to within 1 millim. of the anterior margin, but are separated by about 5 millim. posteriorly : the *mantle-margin* projects far over the head dorsally, and is slightly emarginate ventrally. The *siphon* is conical, reaching two thirds up to the gap between the ventral arms.

The *Head* is short and broad ; the *eyes* prominent.

The *Arms* are subequal, their order of length being 4, 3, 1, 2 ; they are about one fourth as long as the body and taper to fine points : the dorsal are conical with a very slight ridge up the outer aspect, the third pair have a similar ridge ; the ventral are flattened and bear a distinct crest. The *suckers* are in four series throughout and of moderate size, set obliquely on short peduncles, with meridional grooves on the outside : the *horny ring* bears from twenty to twenty-five long, square-cut, irregular teeth in its distal semicircumference, and outside it is an area covered with close-set papillæ. The *hectocotylus* is not developed. The *umbrella* is slight, reaching only as high as the sixth row of suckers between the third and fourth arms, where it is widest ; as usual it is entirely absent between the two ventral arms. The *buccal membrane* has the usual seven points. The *spermathecal cushion* is not developed : the *outer lip* is smooth, except for a few ridges due to contraction ; the *inner lip* bears numerous small papillæ.

The *Tentacles* are about as long as the body, the *stem* being three-sided : the *club* is short, flattened, and expanded, with a protective membrane on either side and a broad web down the back, reaching along the stem for a distance equal to half the length of the club ; it bears six larger *suckers* in the central row, a series of smaller ones on either side, and some very minute ones along each margin ; at the top are from fifteen to twenty in four series. The *horny ring* of the large suckers has from twenty-five to thirty teeth in its distal semicircle ; those of the smaller about ten.

The *Surface* is smooth, except for a few irregular incon-

stant papillæ on one side of the ventral surface and below the eye.

The *Colour* is a pale yellowish grey, darker above.

The *Shell* is oval in *outline*, broadest anteriorly to the middle, tapering somewhat rapidly in front and ending in a semi-circle; posteriorly it tapers gently, and, then rounding off, ends in two almost straight lines, which meet at a right angle at the base of the spine. The *chitinous margin* extends but slightly over the *dorsal surface*, which shows two grooves diverging as they pass forwards, separating three ribs, and is covered with rounded papillæ arranged in curves parallel to the anterior margin. The *ventral surface* has a rather deep and broad median groove: the *last locus* occupies one third of its extent, and is bounded posteriorly by a wavy line with three parts; the *striated area* is hollowed, so that this part of the shell is thin: the *inner cone* commences by two limbs, which arise halfway along the striated area, curve outwards, and unite below the posterior apex with a broad chitinous band passing from one side of the shell to the other and forming a rather deep *outer cone*: the *spine* is short (but has been broken off); it bends slightly upwards and has a narrow longitudinal keel on its ventral surface.

Hab. South of Papua (Station 188), in 28 fathoms. Two specimens, ♀.

Septa cultrata, Steenstrup MS.

The *Body* is elongated, broadest about the middle of its length. The *fins* are rather narrow, about one fourth the breadth of the body, commencing 2 millim. from the anterior edge of the body and approaching within 5 millim. of each other posteriorly; the left is somewhat broader than the right. The *mantle-margin* extends far over the head dorsally and is not emarginate but slightly undulating ventrally. The *siphon* is short, terminating far short of the depression between the ventral arms.

The *Head* is broad, and the *eyes* very prominent.

The *Arms* are subequal, the order of length being 4, 3, 1, 2; they are one fourth the length of the body, all are flattened and taper evenly to fine points. The *suckers* are in four series, except in the right dorsal arm, where they appear to be in two, probably owing to its state of extreme compression; they are of medium size, many are deeply notched proximally and distally, and provided with fine meridional grooves on the margin: the *horny ring* is smooth and surrounded by a papillary area. The *hectocotylus* is not

developed. The *umbrella* is small, widest between the lateral arms, where it reaches up to the sixth or seventh row of suckers. The *buccal membrane* has five distinct points, the ventral edge being thickened and forming a large folded *spermatic cushion*; it bears no suckers. The *outer lip* is thick, and marked with fine longitudinal grooves; the *inner* is papillate.

The *Tentacles* are as long as the mantle, with a three-sided flattened *stem*, much broader proximally than distally. The *club* is slightly expanded, with a narrow protective membrane below, a broad one above, and a distinct web outwardly. There are five or six series of *suckers*, slightly larger in the middle than at the margins, on very long slender peduncles: the *horny ring* is smooth.

The *Surface* bears a number of small irregularly scattered papillæ, four or five elongated warts near the origin of the fins on the dorsum, and some folds in the skin on the ventral surface; probably these last are due to contraction.

The *Colour* is a dull grey, with a bluish shade above, inclining to yellow below.

The *Shell* has an elongate oval *outline*, broadest one third of the way back and rounded off at both ends. The *chitinous margin* is narrow anteriorly, then broader, evanescent posteriorly, a deep calcareous ridge forming the posterior extremity of the shell; it extends very little over the *dorsal surface*, which bears only faint indications of a median ridge and is beset with fine granules disposed in rows parallel to the anterior margin. The *ventral surface* is elevated so as to give the shell a more than average thickness: the *last locus* occupies one third the surface and is bounded by a transverse hemi-elliptical curve: the *striated area* is excavated, but slightly convex in the middle line. The *inner cone* consists only of the slightly elevated limbs, which run along three quarters of the striated area and unite with each other as a flattened fillet posteriorly. The *spine* has lost its extreme point, but is strong, and has a raised knife-like ridge developed upon its ventral aspect*.

Hab. Off south-east coast of Australia (Station 163), depth 2200 fathoms. One specimen, ♀.

METASEPIA, subgen. nov.

Sepia (Metasepia) Pfefferi†, n. sp.

The *Body* is short and stout, broadest about the middle of

* Whence the specific name.

† Named after Dr. George Pfeffer of the Hamburg Museum.

its length, very thick (dorso-ventrally), and bluntly rounded behind. The *fins* are one fourth as broad as the body and placed much nearer the dorsal than the ventral surface; they commence 2-3 millim. from the anterior margin and are connected by a narrow fillet behind; a slightly raised ridge passes down the ventro-lateral aspect of the body, similar to that seen in many specimens of *Octopus* and *Eledone* (possibly due to contraction). The *mantle-margin* projects very slightly dorsally and is a trifle emarginate opposite the funnel: the *connective cartilages* are deeper than in most species of *Sepia*, but there is no distinct knob as in *Sepiella*. The *siphon* reaches up to the depression between the ventral arms.

The *Head* is broad, and the *eyes* prominent.

The *Arms* are subequal, in order of length 3, 4, 2, 1; they are rather more than half as long as the body and distinctly three-sided, having a ridge on the outer side of each, broadest on the ventral ones; they taper evenly to very fine points; the inner surface of each is roughly papillate and has hemispherical depressions into which the suckers are retracted. The *suckers* are in four series throughout, almost hemispherical, not very oblique, and marked with meridional grooves: the *horny ring* bears irregular square teeth. The *hectocotylus* is not developed. The *umbrella* is larger than usual in the genus, reaching on an average about one third up the arms; the *buccal membrane* has seven not very prominent points, and there is a *spermatie cushion* as usual: the *outer lip* is very thin, the *inner* thick and papillate.

The *Tentacle* is about as long as the body, stout, indistinctly three-sided, and tapering. The *club* is short and but little expanded, with a narrow protective membrane on its outer side; the sucker-bearing area is, as it were, undermined on its inner aspect by a deep groove or fissure, and internally to this again is a broad fin which reaches down the tentacle for a distance exceeding half the length of the club. There are three *suckers* much longer than the rest, whereof the middle one is the largest and the proximal the next, placed on stout peduncles arising in deep depressions; towards the outer side of the club is a series of about four medium-sized suckers, and beyond these again one or two series of minute ones. The *horny rings* appear smooth under a powerful lens.

The *Surface* is smooth in general, but there are a few irregular papillæ in the ventro-lateral region.

The *Colour* is a dull grey, with indications of annular markings on the back.

The *Shell* has a rhomboidal outline, with rounded anterior and lateral angles; the *chitinous margin* is narrow, widest

behind, where it forms a flat, acute-angled plate, the posterior extremity of the shell; it covers entirely, however, the *dorsal surface*, which is slightly raised mesially and marked by a number of faint striæ radiating from the posterior end. The *ventral surface* is much elevated on either side of a median groove; the *last loculus* occupies one sixth of the surface, is bounded by a wavy line, and deeply emarginate in the middle. The *inner cone* is represented only by a narrow rib reaching halfway along each posterior side of the shell and meeting its fellow in a rounded angle behind, from which a number of radiating calcareous streaks pass outwards into the horny termination.

Hab. South of Papua (Station 188), 28 fathoms. One specimen, ♀.

Ægopsidæ.

HISTIOPSIS, Hoyle.

Histiopsis, Hoyle, 1885, Narr. Chall. Exp. vol. i. p. 273 (*nomen tantum*).

Resembles *Calliteuthis*, Verrill, in the shape of the body and fin and in the pigment spots scattered over it, but has a web extending for some distance between the dorsal, dorso-lateral, and lateral arms: the suckers are in two series. The siphon has a suspensory ligament and a valve. The gladius has not been removed.

Histiopsis atlantica, Hoyle (*loc. cit.*).

The *Body* is short, conical; acuminate and curving gently downwards posteriorly. The *fin* is about one third the length of the body and considerably broader than long; each half is roughly semicircular and narrows in to its insertion both in front and behind. The *mantle-margin* is in general transverse, but projects slightly as a blunt rounded angle in the dorsal median line. The *mantle-connective* consists of a groove with a narrow median fillet in the mid-dorsal line fitting into a corresponding cartilaginous surface on the back of the neck, and of a long linear ridge extending up to the margin, which fits into a shorter groove on the base of the *siphon*; this is broad, short, and conical, and has a thick suspensory ligament, through the skin of which two muscles may be distinguished, and a distinct valve.

The *Head* is as large as the body, rounded at the sides and flattened above and below. The *eyes* appear to have been enormous; one is distended and protrudes from its orbit, whilst

the other is shrivelled. There is no auricular crest and no preocular pore, but behind each eye is a white papilla.

The *Arms* are about equal in length to the head and body together; the dorsal are the shortest, the other three pairs subequal, the order of length being 3, 4, 2, 1; they are quadrilateral with rounded angles externally, with two slightly raised ridges internally, on which the suckers are situated; they taper gradually to very slender tips; the third pair have a delicate narrow web along the third quarter of their outer aspect. The *suckers* are in two series throughout; they are small and distant along the proximal third (the webbed portion) of the arms, then larger and closer, and finally minute and very closely set towards the tips; they are set transversely on short conical peduncles, spheroidal with a swollen band round the face. The *horny ring* is smooth proximally; distally it bears about five close-set, broad, bluntly rounded teeth. No trace of a *hectocotylus* could be found. The *umbrella* is found only between the dorsal, dorso-lateral, and lateral arms; it takes origin from the sucker-bearing ridge and extends about one third up the arms. The *buccal membrane* is broad and somewhat contracted over the mouth; it has the usual seven points, but they are very blunt and indistinct; it is united by three ligaments with the web between the dorsal and dorso-lateral arms, by a ligament with the inner side of each ventro-lateral arm on its ventral aspect and by another to the inner surface of each ventral arm, there being altogether seven ligaments. The membrane bears no suckers; its inner surface is much creased and folded. The *outer lip* is very thin and smooth, and hidden between the creased integument of the buccal membrane and the *inner lip*, which is thick and marked with irregular radial grooves.

The *Tentacles* have been removed; the stumps which remain are not half the length of the arms; they are quadrangular and flattened from above downwards.

The *Surface* bears a large number of papillæ, slightly elevated, resembling those of *Calliteuthis*; they are arranged most thickly on the ventral aspect of the head and body, but also on the dorsal, and extend up the outer aspect of the arms, three series on the ventral arms, two on each of the others. Near the tip of each dorsal arm is a series of four or five black, elongate, egg-shaped swellings, gradually diminishing in size, and forming apparently an extreme development of the papillæ above mentioned. The second pair of arms appears to have been similarly provided; the third has been so stripped of integument towards the tips that it is impossible to ascertain their original condition. In the fourth the warts at the tip are quite similar to those lower down the arm.

The *Colour* is a dull purplish madder, paler above than below; the papillæ are a deep black, with a white centre, usually situated towards the anterior margin. The *buccal membrane*, both sides of the umbrella, and the inner surfaces of the arms, so far as this extends, are a deep purple.

The *Gladius* has not yet been extracted from the solitary individual.

Hab. South Atlantic (Station 333), 2025 fathoms. One specimen, sex?

XXI.—*New Species of Histeridæ, with Synonymical Notes.*

By GEORGE LEWIS.

THE present paper is supplementary to one in this magazine of last June, and treats of thirty-two species, twenty-four of which are now described as new.

Two of the species are *Onthophilæ*, making the total number of described species in the genus nineteen; and as there is no reason for believing this genus to be less circumscribed in its distribution than *Platysoma* or *Paromalus*, although its members are much more difficult to capture, the genus will without doubt ultimately prove to be a large one.

The genus *Onthophilus* is a very interesting one, as the chitin of the exoskeleton is exceedingly opaque and evidently less pure than in the other genera of Histeridæ; and although some of the species, such as *sulcatus*, are beautifully engraved above, the substructure is, as it were, roughly hewn, and the meso- and metasternal plates, as well as the abdominal segments, are coarsely wrought at the sutures. When the chitin of Coleoptera has the appearance of opacity and impurity, we often see it accompanied with elaborate sculpture; and this is, in fact, so general that it is impossible to avoid the conclusion that the composition of the chitin is in some way the cause of the costæ and punctures which constitute the sculpture. Sculpture and opaqueness are most obvious in those Curculionidæ and Tenebrionidæ which inhabit sandy places or the plains of extensive deserts; but they are by no means confined to members of these families, for they exist in a marked degree in many other insects which share their habitat.

Amongst the Histeridæ there is one very remarkable species, *Hister costatus*, from Mexico, which has the opaque exoskeleton and the sculpture of *Onthophilus*, and it is the more worthy of notice because three hundred species of the genus *Hister* have purer chitin and a much less highly wrought sculpture.